

ABSTRACT

[0049] Roughly described, a silicon layer transitions from polysilicon at one surface to amorphous silicon at the opposite surface. The transition can be monotonic, and can be either continuous or it can change abruptly from polysilicon to amorphous silicon. If such a layer is formed as the floating gate of a floating gate transistor structure, the larger grain structure adjacent to the tunnel dielectric layer reduces the formation of a tip (protrusion) and thus reduces leakage. On the other hand, the smaller grain structure adjacent to the gate dielectric layer produces a smooth, more uniform gate dielectric layer. The polysilicon-to-amorphous silicon transistor can be fabricated with a temperature profile that favors polysilicon formation at the start of floating gate deposition, and transitions during deposition to a temperature that favors amorphous silicon deposition at the end of floating gate deposition.